ITIS _ Supporting technologies

1. **VIRTUALIZATION**

Introduction to Virtualization

- **Virtualization** is the process of creating virtual versions of physical components like servers, storage devices, and networks.
- **Types of Hypervisors**:
  - **Type 1 (Bare-metal):** Runs directly on hardware (e.g., Hyper-V, VMware ESXi).
  - **Type 2 (Hosted):** Runs on top of a host OS (e.g., VMware Workstation, VirtualBox).
- **Cloud Computing:**
  - Delivery of computing services over the internet. Types: IaaS, PaaS, SaaS.

Virtualization Advantages

- **Efficient Hardware Utilization**: Run multiple VMs on one physical machine.
- **Increased Availability**: Easy VM replication and recovery.
- **Disaster Recovery**: Quick restoration using snapshots and backups.
- **Just-in-time Delivery**: Instantly provision resources as needed.
- **Energy Saving**: Fewer physical machines reduce power consumption.

Virtualization Disadvantages

- **Increased Complexity**: Requires advanced configuration and monitoring.
- **Expense**: Initial setup and licenses can be costly.
- **VM Sprawl**: Too many unmanaged VMs waste resources.

Common Uses of Virtualization

- **Desktop Virtualization**: Run desktops on centralized servers.
- **Specific Programs**: Isolate legacy apps or run software in sandbox.
- **Test/Dev Environments**: Quickly create disposable VMs.
- **Private Cloud**: Internal cloud for enterprise use.
- **Public Cloud**: Services from providers like AWS, Azure.
- **Choosing Best Solution**: Depends on security, cost, performance.

Hardware Components in Virtualization

- **vCPU**: Logical processors allocated to VMs.
- **vMemory**: RAM assigned to each VM.
- **vStorage**: Virtual disks (VHD, VMDK) mapped to VMs.
- **vNetworking**: Virtual switches, NAT, bridged connections.

- **vGPU**: Virtualized graphic processing for visual w orkloads.

Microsoft Hyper-V

- **Installation**: Enable via Windows Features or Server Manager.
- **Creating VMs**: Use Hyper-V Manager to create VMs.
- **Networking**: Create Virtual Switches (External, Internal, Private).
- **Processor & Memory Allocation**: Configure via VM Settings.
- **Checkpoints**: Snapshots of VM state for quick rollback.

VMware Workstation

- **Installation**: Download and install on host OS.
- **Creating VMs**: Easy wizard-based creation.
- **Networking Setup**: Use NAT, Host-only, or Bridged.
- **Processor & Memory**: Adjustable under VM settings.
- **Cloning**: Full clone or linked clone to duplicate VMs.

Preparing Infrastructure

- **File Systems**: NTFS, ext4, VMFS depending on OS/platform.
- **Storage Options**:
    - **SAN** (Storage Area Network): High performance.
    - **NAS** (Network Attached Storage): File-level access.
    - **Local Storage**: Internal drives for quick setup.
- **Network Configuration**: Ensure bandwidth, IP planning, VLANs.

Troubleshooting

- **Network Issues**: Check switch config, IP conflicts, firewall rules.
- **Performance Issues**: Monitor CPU/memory, check disk IO.
- **Common Errors**: Incompatibility, storage unavailability, VM crash.

Backup, Restore, Migrate VMs

- **Duplicating VMs**: Use export/import or cloning.
- **Backup & Restore**: Scheduled snapshots, VM replication.
- **P2V**: Convert physical to VM using tools like VMware Converter.
- **V2P**: Less common, involves restoring VM image to physical machine.

Conclusion

- Virtualization is essential for modern IT efficiency.
- Study various tools, concepts, and use-cases for exam readiness.

Sample MCQs

1. **Which hypervisor runs directly on hardware?**
   - A. Type 2
   - B. VMware Workstation
   - C. Type 1 ✅
   - D. VirtualBox
2. **Which of the following is a virtualization advantage?**
   - A. Increased hardware cost
   - B. Slower deployment
   - C. Efficient resource utilization ✅
   - D. More physical servers
3. **Which component represents virtual storage?**
   - A. vNIC
   - B. VHD ✅
   - C. vRAM
   - D. vCPU
4. **What is the purpose of Hyper-V checkpoints?**
   - A. Delete a VM
   - B. Restore OS
   - C. Take a snapshot ✅
   - D. Increase performance
5. **Which tool can convert a physical machine to a VM?**
   - A. VMware Converter ✅
   - B. Notepad
   - C. SQL Server
   - D. Disk Cleanup

2. STORAGE NOTES

Storage Foundations

Centralized Storage

- Data is stored in a single location accessible by multiple clients.
- Benefits: easier backup, centralized control, better efficiency.

SAN and NAS Benefits

- **SAN (Storage Area Network):** Block-level storage, high speed, used for databases.

- **NAS (Network Attached Storage):** File-level access, easier to manage, used for file sharing.

Storage Media Types

- **HDD:** Large capacity, slower.
- **SSD:** Faster, expensive.
- **Tape:** Used for archival.

RAID (Redundant Array of Independent Disks)

- RAID 0: Striping, no redundancy.
- RAID 1: Mirroring.
- RAID 5: Striping + parity.
- RAID 10: Mirroring + striping.

Comparing SAN vs NAS

- SAN: Expensive, fast, complex setup.
- NAS: Cost-effective, easier to configure.

NAS Protocols

SMB/CIFS (Windows)

- Used in Windows environments for file sharing.
- Easy to configure via GUI and CLI.

NFS (Network File System)

- Used mainly in UNIX/Linux environments.
- Allows clients to access shared files over the network.

SAN Protocols

Fibre Channel Protocol (FCP)

- High-speed network protocol.
- Uses WWPN for addressing.

Zoning and LUN Masking

- Zoning: Controls which devices can communicate.
- LUN Masking: Controls which LUNs are visible.

Fabric Login & Multipathing

- Ensures redundancy and load balancing.

FCoE (Fibre Channel over Ethernet)

- Combines FC and Ethernet.
- Reduces cabling.

Here are detailed and structured notes on iSCSI, iSCSI Configuration, and an overview of NVMe-oF, tailored for Windows Server 2019 and modern data center contexts.

✅ iSCSI (Internet Small Computer Systems Interface)

📌 What is iSCSI?

- iSCSI stands for Internet Small Computer Systems Interface.
- It is a network-based storage protocol that allows computers to connect to remote storage devices over IP networks (typically Ethernet).
- It transports SCSI commands over TCP/IP, allowing block-level access to storage.

🎯 Key Features:

- Allows remote disks to appear as locally attached drives.
- Uses initiator (client) and target (server) model.
- Ideal for SAN (Storage Area Network) deployments using standard network hardware.
- Supports authentication (CHAP), multipathing, and failover.

✅ iSCSI Components

Component	Role
Initiator	The client machine that sends SCSI commands to access storage.
Target	The storage resource/server that receives and responds to commands.
LUN	Logical Unit Number – the actual storage volume exposed to clients.
Portal	IP address and port on the target that listens for iSCSI requests.

✅ iSCSI Configuration in Windows Server 2019

🖥️ On the Target Server (Storage Provider):

1. Install iSCSI Target Server Role:
    - Use Server Manager → Add Roles → File and Storage Services → iSCSI Target Server.
2. Create iSCSI Virtual Disk:
    - Open Server Manager → File and Storage Services → iSCSI.
    - Click “To create an iSCSI virtual disk, start the New iSCSI Virtual Disk Wizard.”
    - Choose location and size (fixed or dynamically expanding).

3. **Create Target:**
    - **Assign a name to the target.**
    - **Add initiator IQN (found on the client side).**
    - **Configure authentication (CHAP, Mutual CHAP if needed).**

🖥️ On the Client (Initiator):

1. **Start iSCSI Initiator Service:**
    - **services.msc → Start Microsoft iSCSI Initiator Service.**
    - **Or open iSCSI Initiator from the Start Menu.**
2. **Connect to Target:**
    - **Enter the IP address of the target server.**
    - **If successful, the discovered targets appear.**
    - **Click Connect → Log on automatically at startup.**
3. **Initialize and Format Disk:**
    - **Go to Disk Management → Find the new unallocated disk.**
    - **Initialize → Create volume → Format → Assign drive letter.**

✅ NVMe-oF (NVMe over Fabrics) – Overview

📌 What is NVMe-oF?

- **NVMe-oF (Non-Volatile Memory Express over Fabrics) extends NVMe storage protocol over a network fabric (e.g., Ethernet, Fibre Channel, InfiniBand).**
- **It enables remote access to NVMe storage devices with very low latency.**

🎯 Key Features:

- **Offers higher performance than iSCSI or traditional SCSI over IP.**
- **Designed for high-throughput, low-latency applications (e.g., databases, virtualization).**
- **Allows multiple hosts to access NVMe storage over network.**

🚀 NVMe-oF Transport Types:

Transport Type	Description
RoCE	RDMA over Converged Ethernet – very low latency.
Fibre Channel	Traditional SAN networks adapted for NVMe.
TCP	NVMe over standard Ethernet using TCP/IP (easier setup).

🔍 NVMe-oF vs iSCSI

Feature	iSCSI	NVMe-oF
Protocol Stack	SCSI over TCP/IP	NVMe over TCP/RDMA/FC
Performance	Moderate	Very High (especially with RDMA/FC)
Latency	Higher	Very Low
Setup Complexity	Simple	Complex (unless using NVMe/TCP)
Use Case	General storage, legacy support	High-performance computing, fast storage

---

📌 Summary Table

Concept	iSCSI	NVMe-oF
Access Type	Block-level	Block-level
Transport	TCP/IP	TCP, RoCE, Fibre Channel
Speed	Good	Excellent
Use Case	Standard enterprise storage	High-performance NVMe storage sharing
OS Support	Broad (Windows, Linux, etc.)	Still growing, mostly newer OS support

---

📝 Sample MCQs

Q1. Which protocol does iSCSI use to transport SCSI commands?

A. UDP

B. HTTP

C. TCP/IP

D. SMB

✅ **Answer: C. TCP/IP**

Q2. What is the role of an iSCSI initiator?
A. Provide storage to clients
B. Connect to a storage target
C. Manage DNS on a network
D. Host virtual machines
✅ **Answer: B. Connect to a storage target**

Q3. What is a key benefit of NVMe-oF over iSCSI?
A. Uses less disk space
B. Lower latency and higher throughput
C. Requires no network connection
D. Built into Windows 7 by default
✅ **Answer: B. Lower latency and higher throughput**

Windows Server 2016: Storage Services – Full Notes

---

1. Introduction to File and Storage Services in Windows Server 2016

a. Introduction to File and Storage Solutions

Windows Server 2016 provides comprehensive file and storage services for enterprise-level deployments. It supports traditional file sharing, network-based storage management, and modern technologies like iSCSI, NFS, and DFS. These services are crucial for managing large-scale data and enabling secure, reliable access across departments or remote offices.

b. Computer Management Demonstration

The Computer Management console includes tools like Disk Management for configuring storage devices. Administrators can:

- View disk properties and usage
- Initialize new disks
- Create, delete, and format partitions/volumes
- Manage removable and virtual drives

c. Server Manager Storage Role Services Explained

Server Manager allows administrators to install and manage roles and features such as:

- File Server
- NFS server
- Data Deduplication
- DFS namespaces and replication
  It also provides an interface to add servers, manage storage pools, and monitor system health.

d. Command-Line Disk Formatting

You can format and manage disks using diskpart, format, and PowerShell commands. For example:

- diskpart – create and manage partitions
- format – format a drive with NTFS/ReFS
- PowerShell – automate volume creation and file system assignment

e. Command-Line File Utilities

Useful commands include:

- fsutil: view and manage file system properties
- robocopy: copy files/directories with advanced options
- xcopy: legacy command for copying data
  These tools aid in scripting file operations and automating administrative tasks.

f. Volumes and Disks

Disks can be configured as basic or dynamic. Volumes include:

- Simple, Spanned, Striped (RAID 0), Mirrored (RAID 1)
- GPT and MBR partition styles
  You can extend, shrink, or delete volumes using GUI tools or PowerShell.

---

2. Configure Advanced File Services

a. Configure Network File System (NFS) Data Store

NFS allows file sharing between Windows and UNIX/Linux systems. Steps:

- Install NFS Server role
- Create an NFS share with access permissions
- Clients mount the share using their local tools

b. Configure BranchCache

BranchCache caches content at branch offices to reduce WAN usage. Types:

- Distributed cache (peer-to-peer)
- Hosted cache (centralized server)
  Enable via Group Policy and configure cache location.

c. Configure File Server Resource Manager (FSRM)

FSRM allows:

- Quota management
- File screening (restrict file types)
- Storage reports (identify duplicate files, usage)

d. Resource Monitor

Tracks CPU, memory, disk, and network usage. Useful for monitoring:

- Disk I/O performance
- Resource-hogging processes

e. Configure File Access Auditing

Auditing tracks who accessed, modified, or deleted files. Steps:

- Enable object access auditing via Group Policy
- Set auditing settings on files/folders

f. View Effective File Access Permissions

Effective Permissions show the actual access level of users or groups after evaluating NTFS and inherited permissions.

---

3. Implement Dynamic Access Control (DAC)

a. Introduction to DAC

DAC allows fine-grained access control based on user claims, device claims, and resource properties. Unlike NTFS, DAC uses logic-driven central policies.

b. Configure User and Device Claim Types

Define claim types in Active Directory. Examples:

- Department
- Security clearance

c. Configure Resource Properties & Lists

Assign tags (resource properties) like "Confidential" or "Finance" to folders. Group these into lists for easier policy application.

d. Configure Central Access Rules and Policies

Create rules such as: "Users from HR can access files tagged 'HR' during work hours."
Apply via Group Policy to folders or shares.

---

4. Configure and Optimize Storage

a. Configure an iSCSI Target

An iSCSI target is a storage endpoint accessed over TCP/IP. Steps:

- Install iSCSI Target Server role
- Create virtual disks and assign targets

b. Configure an iSCSI Initiator

The initiator (on the client/server) connects to the target. Use the built-in tool to:

- Discover targets
- Configure authentication (CHAP)
- Connect and mount disks

c. Understanding iSNS, DCB, and MPIO

- **iSNS**: Central registry for iSCSI targets
- **DCB**: Provides QoS for storage traffic
- **MPIO**: Enables multiple paths for failover and load balancing

d. Implement Thin Provisioning

Allocates storage dynamically. Saves disk space until data is written.

e. Manage Server Free Space Using Features on Demand

Installs server components only when needed, freeing up disk space.

f. Configure Tiered Storage

Uses SSDs and HDDs. Frequently accessed data is stored on SSDs, while archival data remains on HDDs.

g. Describe DAS, NAS, SAN

- **DAS**: Directly attached; limited scalability
- **NAS**: File-based sharing over the network
- **SAN**: Block-level access over iSCSI/FC; high-performance

---

5. Additional Storage Roles

a. Data Deduplication Intro & Practical Use

Removes redundant data blocks. Saves storage space. Ideal for:

- File servers
- VDI libraries
  Can be scheduled for background execution.

b. Storage on Hyper-V

Manages virtual hard disks (VHD/VHDX). Features:

- Dynamic or fixed size
- Checkpoints
- Shared VHDX for guest clustering

c. Extend and Shrink Storage Drive Partitions

Done using Disk Management or PowerShell:

- Resize-Partition command in PowerShell

d. Formatting Options

- **NTFS**: Standard file system
- **ReFS**: Supports large volumes, better integrity, no defrag needed

---

6. Distributed File System (DFS)

a. Installation of DFS Role

Install DFS Namespace and DFS Replication roles. Use Server Manager.

b. DFS Namespace

Creates a unified folder view for users regardless of server location. E.g., \domain\shared

c. DFS Replication

Replicates data across sites/servers for high availability.

d. DFS Drive Mapping

Map drives via GPO to DFS paths for user access.

e. Scripting DFS Mapping

Use PowerShell scripts or net use commands in login scripts.

---

7. Other Storage Options

a. Volume Shadow Copy (VSS)

Creates snapshots of files/folders. Useful for point-in-time recovery.

- Supports up to 64 copies per volume

b. File Server Agent for Volume Shadow

Used by backup applications to trigger VSS snapshots.

c. Creating RAID Mirroring Partition

RAID 1 provides redundancy by duplicating data.

d. Creating RAID with Striping and Parity

- RAID 0: striping only (performance)
- RAID 5: striping + parity (balance of performance and redundancy)

e. File Shares and Security

Control access using:

- Share permissions (on network level)
- NTFS permissions (more granular)

Sample MCQs

1. Which utility is used to manage disk partitions from the command line?
    - A) fsutil
    - B) robocopy
    - C) diskpart ✅
    - D) chkdsk
2. What tool helps in managing file quotas and screening unwanted files?
    - A) Active Directory
    - B) Group Policy
    - C) FSRM ✅
    - D) File Explorer
3. Which component allows dynamic access decisions based on attributes?
    - A) NTFS
    - B) ReFS
    - C) Central Access Policy ✅
    - D) GPO
4. What enables Windows Server to expose virtual disks to clients over TCP/IP?
    - A) DFS
    - B) NFS
    - C) iSCSI Target ✅
    - D) SAN

5. Which file system is optimized for integrity and large-scale data sets?
    - A) NTFS
    - B) FAT32
    - C) ReFS ✅
    - D) exFAT
6. What component of DFS ensures data availability across multiple servers?
    - A) DFS Namespace
    - B) DFS Replication ✅
    - C) SMB
    - D) NTFS Permissions
7. How many shadow copies can VSS maintain per volume?
    - A) 10
    - B) 48
    - C) 64 ✅
    - D) Unlimited

Let me know if you'd like diagrams, command summaries, or practice test PDFs!

3. BACKUP & RESTORE

Backup Types and Solutions

Overview

- Protects data from failures or deletions.
- Ensures continuity and quick recovery.

Full Backup

- Copies all data.
- Easy to restore but takes time and space.

Incremental Backup

- Copies only changes since the last **any** backup.
- Fast backup, slowest restore.

Differential Backup

- Copies changes since last **full** backup.
- Middle ground between speed and size.

Copy Backup

- Manual backup; doesn't affect backup strategy.
- Useful before major changes.

Daily Backup

- Files changed in one day.
- Light, but limited.

Storage for Backup

Internal Storage

- Simple and local, but risky.

SAN (Storage Area Network)

- Fast, scalable, for enterprises.

DVD

- Archive-only. Obsolete for modern use.

Network Share

- Backup over LAN/WAN. Easy to set up.

Cloud Storage

- Offsite, scalable. Needs security.

NAS (Network Attached Storage)

- File-level network access. Ideal for SMBs.

Storage Replica

- Replicates volumes across locations.
- Disaster Recovery option in Windows Server.

Backup Security

- Encrypt backups.
- Implement role-based access and secure channels.

Windows Backup

Server Backup Installation

- Add via Server Manager > Features.
- GUI and command-line supported.

Windows 10 Backup

- File History (user files), System Image (full OS).

Scheduling Backups

- Set via Task Scheduler or in the GUI.

Volume Shadow Copy Service (VSS)

- Backs up locked files using snapshots.

File and Volume Restore

- Granular restore using Windows Server Backup console.

Bare Metal Restore

- Complete OS and system restore.
- Used after catastrophic failure.

System State

- Critical system components: AD, registry, boot files.

Linux Backup

Duplicity

- Command-line tool for encrypted, compressed backups.
- Supports full/incremental and remote storage.

Commercial Backup Products

Veeam

- Best for virtual machines.
- Supports replication and cloud integration.

Backup Exec

- Backs up to cloud, disk, or tape.

Arcserve

- Real-time data protection.

Commvault

- Unified platform. Enterprise-grade backup.

Synthetic Backup

- Merges incremental + full = synthetic full.
- Faster restore with fewer files.

Cloud Integration

- Backup tools now support AWS, Azure, Google Cloud.

Cloud Backup

Microsoft Azure

- Azure Recovery Services Vault.
- Good for hybrid and offsite backups.

AWS (Amazon Web Services)

- S3: frequent backups. Glacier: long-term, low-cost.
- AWS Backup manages services centrally.

Conclusion

- Use **multiple backup strategies**.
- Ensure **offsite + local + cloud** storage.
- Schedule regular backups.
- Secure all backups.
- Test restore functionality.

All MCQs (for Review)

Backup Types

1. Fastest backup, slowest restore?
   Ans: b) Incremental
2. Which does NOT reset archive bit?
   Ans: a) Copy

Storage Options

3. High-performance enterprise storage?
   Ans: b) SAN
4. NAS advantage?
   Ans: c) File-level sharing

Windows Backup

5. Required for live file backup?
   Ans: b) Volume Shadow Copy
6. Used for complete system failure restore?
   Ans: c) Bare metal restore

Linux Backup

7. Tool for encrypted Linux backup?
   Ans: c) Duplicity

Commercial Products

8. Key benefit of synthetic backups?
   Ans: d) Faster restore, fewer backups needed
9. VM-focused backup tool?
   Ans: b) Veeam

Cloud Backup

10. Azure backup service?
    Ans: b) Azure Recovery Services Vault
11. AWS long-term archive?
    Ans: c) Glacier

---

4. DATABASE

MTA Database Fundamentals (98-364) Cert Prep: Core Concepts - Notes and MCQs

Understanding Data Storage Models

What are Databases?

- Organized collection of structured data.
- Enables efficient storage, retrieval, and manipulation of information.

Flat File Databases

- Stores data in plain text or spreadsheet-like formats.
- Suitable for small, simple datasets.
- No relationships or indexing.

Hierarchical Databases

- Organizes data in a tree-like structure (parent-child relationships).
- Fast retrieval for structured relationships.
- Difficult to restructure or scale.

Relational Databases

- Stores data in tables with rows and columns.
- Tables are related through keys (primary/foreign).
- Most widely used model (e.g., MySQL, SQL Server).

Database Fundamentals

- Includes tables, records, fields, and primary keys.
- Tables hold data; fields define columns; records represent rows.

Calculating Values

- Use queries and expressions to compute data.
- Example: SUM(), AVG(), COUNT() in SQL.

Building Your Server

Role of the Server

- Hosts and manages databases.
- Processes queries, transactions, and ensures availability.

Installing SQL Server 2014 Express

- Lightweight version of SQL Server.
- Suitable for learning and small-scale deployments.

Installing SQL Server Management Studio (SSMS)

- GUI to interact with SQL Server.
- Allows creation, editing, and querying of databases.

Restoring a Database

- Use SSMS to load backup files (.bak).
- Important for disaster recovery.

Creating a Database and Table

- Define a new database with name and location.

- Use "New Table" in SSMS to add columns, data types, and constraints.

Modifying and Removing Tables/Databases

- Add/edit columns, change data types.
- Delete using "DROP DATABASE" or GUI.

Views

- Virtual table created using SELECT queries.
- Simplifies access to complex queries.

System Tables

- Internal metadata tables.
- Contains schema, logs, and user info.

Understanding Data Definition Language (DDL)

DDL Statements

- CREATE, ALTER, DROP, TRUNCATE.
- Used to define and manage database schema.

Creating Objects

- Example: CREATE TABLE Students (ID INT, Name VARCHAR(50));
- Defines structure before inserting data.

USE Command

- Switches the context to a specific database.

ALTER and DROP

- ALTER: Modify existing structures (e.g., add a column).
- DROP: Permanently delete tables, databases, views.

TRUNCATE

- Deletes all rows from a table without logging individual row deletions.
- More efficient than DELETE for large datasets.

Understanding Data Manipulation Language (DML)

DML Commands

- SELECT, INSERT, UPDATE, DELETE, MERGE.
- Used for interacting with data inside tables.

SELECT

- Retrieves data from one or more tables.
- Can include filters, joins, sorting.

INSERT

- Adds new rows to a table.
- Example: INSERT INTO Students VALUES (1, 'John');

UPDATE

- Modifies existing records.
- Example: UPDATE Students SET Name='Jane' WHERE ID=1;

DELETE

- Removes records based on condition.
- DELETE FROM Students WHERE ID=1;

MERGE

- Combines INSERT, UPDATE, DELETE into one statement.
- Used for synchronizing tables.

Understanding Relational Database Concepts

Relationships

- Links between tables via keys.
- One-to-One, One-to-Many, Many-to-Many.

Constraints

- Rules to ensure data integrity (e.g., NOT NULL, UNIQUE, PRIMARY KEY).

Indexes

- Improve query performance by speeding up search.

Naming Conventions

- Use consistent, descriptive names.
- Avoid spaces, use snake_case or camelCase.

Schemas

- Logical container for tables, views, and other objects.
- Helps with organization and security.

All MCQs (for Review)

Chapter 1: Storage Models

1. What type of database uses parent-child relationships?
   a) Relational
   b) Flat file
   c) Hierarchical
   d) XML
   Ans: c

2. Which model is most widely used in modern systems?
   a) Network
   b) Flat file
   c) Relational
   d) Object-oriented
   Ans: c

3. Which component represents a row in a table?
   a) Field
   b) Record
   c) Column
   d) Index
   Ans: b

Chapter 2: Building Server

4. What tool allows GUI access to SQL Server?
   a) MySQL Shell
   b) SQLCMD
   c) SSMS
   d) Power BI
   Ans: c

5. What command deletes a database?
   a) REMOVE DATABASE
   b) TRUNCATE DATABASE
   c) ERASE DATABASE
   d) DROP DATABASE
   Ans: d

6. What is a "view" in SQL?
   a) Backup of a table
   b) Virtual table from SELECT query
   c) Permanent storage of logs
   d) SQL Server console
   Ans: b

Chapter 3: DDL

7. Which command modifies an existing table?
   a) CREATE
   b) SELECT
   c) ALTER
   d) TRUNCATE
   Ans: c

8. What command permanently deletes a table?
   a) DELETE
   b) TRUNCATE
   c) DROP
   d) REMOVE
   Ans: c

9. Which command switches to a specific database?
   a) USE
   b) GO
   c) SELECT

d) SWITCH

Ans: a

Chapter 4: DML

10. Which command is used to retrieve data?
    a) INSERT
    b) UPDATE
    c) SELECT
    d) DELETE
    Ans: c

11. What command is used to change existing data?
    a) INSERT
    b) MERGE
    c) ALTER
    d) UPDATE
    Ans: d

12. What is the purpose of the MERGE command?
    a) Merge databases
    b) Restore backups
    c) Synchronize tables
    d) Create schemas
    Ans: c

Chapter 5: Relational Concepts

13. What ensures unique values in a column?
    a) INDEX
    b) FOREIGN KEY
    c) NOT NULL
    d) PRIMARY KEY
    Ans: d

14. What improves query speed?
    a) Constraints
    b) Indexes
    c) Views
    d) Schemas
    Ans: b

15. Which is used to group database objects?
    a) Tables
    b) Indexes
    c) Schemas
    d) Logs
    Ans: c

5. **MOINTORING TOOLS**

📘 Monitoring Tools – Complete Notes

🔹 **IT Service Desk: Monitoring and Metrics Fundamentals – Notes and MCQs**

Introduction

- Monitoring service management ensures success through data-driven decisions.
- Key to understanding customer satisfaction and service desk efficiency.

Collecting Valid Service Management Data Points

From Data to Wisdom

- Data → Information → Knowledge → Wisdom (DIKW Pyramid).
- Understand the context of raw data to derive actionable insights.

Garbage In, Garbage Out

- Poor-quality input leads to unreliable outputs.
- Ensure accuracy and relevance when collecting data.

How to Kill Good Data

- Mixing valid and invalid data can corrupt datasets.
- Avoid subjective data and biased collection methods.

Less is Sometimes More

- Don’t collect excessive data without a purpose.

- Focus on actionable and business-aligned data points.

Always Review Your Data

- Regular reviews maintain data accuracy and relevance.
- Clean outdated, duplicate, or incorrect records.

Why Monitor Service Management Performance?

Why Are You Monitoring?

- Aligns IT performance with business outcomes.
- Identifies issues before they impact users.

Outcomes for Monitoring

- Track resolution times, customer satisfaction, ticket volumes.
- Benchmark against KPIs and SLAs.

Knowing What Actions to Take

- Data should trigger corrective or preventive actions.
- Use results to train staff, optimize workflows, or invest in tools.

Determining Which Metrics to Monitor

Most Common Metrics

- Average resolution time, ticket backlog, first call resolution (FCR), SLA compliance.
- Customer satisfaction score (CSAT), Net Promoter Score (NPS).

Role of Service-Level Agreements (SLAs)

- Defines expected service delivery standards.
- Metrics track SLA breaches and compliance.

Net Promoter Score (NPS)

- Measures customer loyalty with one question: “Would you recommend us?”
- Score from -100 to +100. Promoters (9–10), Passives (7–8), Detractors (0–6).

How Does NPS Work?

- % Promoters − % Detractors = NPS.
- Higher NPS indicates greater customer satisfaction.

Exploring Tools and Reporting

Common Reporting Tools

- Excel, Power BI, Tableau, ServiceNow dashboards.
- Visualization helps interpret data quickly.

Visibility of Reporting

- Reports must be shared with relevant stakeholders.
- Transparent and frequent reporting improves accountability.

Baseline Reporting

- Establishes performance benchmarks.
- Helps track progress over time.

All MCQs (with Answers)

Chapter 1: Data Collection

1. What does "Garbage In, Garbage Out" refer to?
   a) Low storage capacity
   b) Poor-quality data input leads to bad outputs
   c) Lack of data sharing
   d) Data deletion processes
   Ans: b
2. What is the top level in the DIKW pyramid?
   a) Data
   b) Knowledge
   c) Information
   d) Wisdom
   Ans: d
3. What is a risk of collecting too much irrelevant data?
   a) Increased processing power
   b) Improved clarity

c) Reduced focus and data overload
d) Enhanced metrics
Ans: c

Chapter 2: Monitoring Purpose

4. What is a main reason to monitor service desk performance?
   a) To increase database size
   b) To track server temperature
   c) To align IT performance with business outcomes
   d) To replace staff
   Ans: c
5. What should monitoring outcomes help with?
   a) Blocking users
   b) Adjusting IT infrastructure randomly
   c) Driving informed actions and decisions
   d) Minimizing reporting
   Ans: c

Chapter 3: Metrics and SLAs

6. What is tracked by SLA metrics?
   a) Storage usage
   b) Employee salaries
   c) Service delivery compliance
   d) Database backups
   Ans: c
7. How is Net Promoter Score (NPS) calculated?
   a) Average of all responses
   b) Promoters + Detractors
   c) % Promoters − % Detractors
   d) % Passives − % Promoters
   Ans: c
8. What does a high NPS indicate?
   a) More complaints
   b) Poor service quality
   c) Higher customer loyalty and satisfaction
   d) Faster ticket resolution only
   Ans: c

Chapter 4: Tools and Reporting

9. Which tool is commonly used for service desk reporting?
   a) GitHub
   b) Tableau
   c) Instagram

d) Notepad
Ans: b

10. Why is baseline reporting important?
    a) It helps design websites
    b) It tracks staff attendance
    c) It establishes performance benchmarks
    d) It controls email spam
    Ans: c

---

6. **MICROSOFT OFFICE 365**

Microsoft Office 365 – Complete Notes

Learning Office 365 (Microsoft 365) - Notes and MCQs

About Office 365

What is Office 365?

- Cloud-based productivity suite from Microsoft.
- Includes apps like Word, Excel, PowerPoint, Outlook, Teams, SharePoint, and OneDrive.
- Enables work across devices with real-time collaboration.

Choose the Right Plan

- Plans are tailored for individuals, businesses, and enterprises.
- Key options: Microsoft 365 Personal, Family, Business Basic, Business Standard, and E3/E5 for enterprises.
- Selection depends on features like number of users, advanced security, and app access.

System Requirements

- Windows 10 or later, macOS Sierra (10.12) or later.
- Requires internet connection for installation and updates.
- Certain features depend on Microsoft Edge or other updated browsers.

Get Started with Office 365

Sign In to Office 365

- Use your Microsoft account at https://office.com.
- Personalized dashboard with access to all licensed apps.

Install the Client Apps

- Install apps like Word, Excel, PowerPoint on PC or Mac.
- Use Microsoft 365 installer or Microsoft Store.

Navigate from App to App

- App launcher grid ("waffle" icon) helps switch between apps.
- Consistent interface across devices.

Set Up Your Profile

- Customize profile picture, language, contact information.
- Available under "My Account" settings.

Store and Sync Files

- Save files directly to OneDrive.
- Auto-sync between devices.
- Enables easy sharing and backup.

Share and Collaborate

Use SharePoint to Share Information

- Team sites for document sharing and collaboration.
- Manage permissions and version history.

Add Files to OneDrive

- Upload or create files directly.
- Share links with view/edit permissions.

Use Desktop Apps with Office 365

- Full desktop experience when connected to Microsoft 365.
- Offline editing supported with sync on reconnect.

Connect with Colleagues

Create Your Own Group in Teams

- Create teams for projects, departments, or interests.
- Organize using channels and tabs.

Chat with Team Members

- Instant messaging with emojis, GIFs, and file sharing.
- Chats stored in Teams for future reference.

Schedule a Meeting with Team Members

- Use Outlook or Teams Calendar.
- Add participants, agenda, meeting link.
- Supports video, screen sharing, and recording.

Conclusion

- Office 365 simplifies productivity and collaboration.
- Offers flexibility across locations and devices.
- Combines the power of desktop apps with the convenience of the cloud.

All MCQs (for Review)

Chapter 1: About Office 365

1. Which app is NOT part of Office 365?
   a) Word
   b) OneDrive
   c) Photoshop
   d) Excel
   Ans: c
2. What is required to use Office 365?
   a) A Google account
   b) A physical CD
   c) A Microsoft account

d) No internet connection
Ans: c

3. Which factor is important in choosing an Office 365 plan?
   a) Weather
   b) Number of employees
   c) Preferred color theme
   d) Device brand
   Ans: b

Chapter 2: Get Started

4. What icon allows you to switch between Office 365 apps?
   a) Bell
   b) Gear
   c) Waffle grid
   d) Magnifying glass
   Ans: c
5. Where are files typically saved in Office 365?
   a) Desktop
   b) Recycle Bin
   c) OneDrive
   d) Control Panel
   Ans: c
6. Which is true about installing Office apps?
   a) They can't be installed
   b) Only available on Linux
   c) Installed through the Office portal
   d) Require developer license
   Ans: c
7. What is the purpose of profile setup?
   a) Enable dark mode
   b) Customize language and user info
   c) Change login screen
   d) Hide account
   Ans: b
8. Which app is primarily used for file storage?
   a) Excel
   b) Word
   c) OneDrive
   d) Teams
   Ans: c

Chapter 3: Share and Collaborate

9. What is SharePoint mainly used for?
   a) Email marketing

b) Document collaboration and sites
c) File compression
d) Software installation
Ans: b

10. Which app allows you to upload and share files?
a) Paint
b) OneDrive
c) Notepad
d) Excel
Ans: b

11. What happens when you go offline in Office apps?
a) Files are deleted
b) You can't type
c) Offline edits are synced later
d) App closes automatically
Ans: c

Chapter 4: Connect with Colleagues

12. What are Teams channels used for?
a) Watching videos
b) Grouping topics in a team
c) Changing themes
d) Archiving chats only
Ans: b

13. Where are Teams chats stored?
a) Clipboard
b) Deleted automatically
c) Within the Teams app
d) In Word
Ans: c

14. Which tool schedules meetings and allows sharing screen?
a) Microsoft Paint
b) Teams
c) OneNote
d) Notepad
Ans: b

---

7. IT SECURITY.

IT Security Foundations

Sure! Here's a streamlined version combining **key topic notes** with **option-wise MCQs**—perfect for review and practice:

🧠 **IT Security Foundations: Core Concepts (MTA 98-367)**

Core Security Principles

- **CIA Triad**: Confidentiality, Integrity, Availability.
- **Risk Management**: Risk = Threat × Vulnerability × Impact. Use mitigation strategies.
- **Social Engineering**: Manipulation techniques (e.g. phishing, pretexting, baiting).
- **Attack Surface**: All possible points of entry; reduce by limiting services/open ports.
- **Threat Modeling**: Use STRIDE—Spoofing, Tampering, Repudiation, Information disclosure, Denial of service, Elevation of privilege.

Understanding Malware

- **Virus**: Requires execution to spread, attaches to files.
- **Worm**: Self-replicating and spreads across systems.
- **Spyware/Adware**: Covertly tracks user behavior, may show ads.
- **Ransomware**: Encrypts data and demands payment for access.

Getting Into Your System

- **Impersonation**: Attackers pose as trusted individuals.
- **Backdoor Access**: Unauthorized hidden entry points.
- **Buffer Overflow**: Overruns memory to execute malicious code.
- **Zero-Day Exploits**: Attacks targeting unpatched vulnerabilities.

Investigating Internet Security

- **HTTPS**: Secure web communication via SSL/TLS encryption.
- **Cookies**: Store user data/preferences, but can reveal sensitive info.
- **Malicious Content**: Block through browser add-ons, antivirus, and firewalls.
- **Browser Hygiene**: Disable unnecessary plugins and keep updated.

Mobile and Wireless Security

- **Wi-Fi Encryption**: Use WPA3 (or WPA2 if necessary), strong passwords.
- **Hidden SSID**: Prevents casual network discovery.

- **Device Security**: Use strong screen lock, app permissions, remote wipe features.
- **VPN Usage**: Secure connection on public Wi-Fi.

Secure Devices and Applications

- **Data Privacy**: Encrypt data both at rest and in transit.
- **Symmetric vs Asymmetric Encryption**:
  - Symmetric: uses a single shared key.
  - Asymmetric: uses public/private key pair.
- **Email Security**: Protect via encryption (S/MIME, PGP), and avoid malicious attachments.

✅ **MCQs (Option-wise)**

Core Security Principles

1. What does the CIA triad stand for?
   a) Control, Integrity, Access
   b) Confidentiality, Integrity, Availability ✅
   c) Compliance, Information, Authentication
   d) Certification, Inspection, Authorization
2. Social engineering refers to:
   a) Manipulating people to gain unauthorized access ✅
   b) Encrypting organizational data
   c) Hardening routers and switches
   d) Installing antivirus software

Understanding Malware

3. Which malware type locks files and demands payment?
   a) Spyware
   b) Worm
   c) Ransomware ✅
   d) Adware
4. A worm differs from a virus because it:
   a) Requires action from the user
   b) Only affects files on disk
   c) Self-replicates without user input ✅
   d) Is embedded in email only

Getting Into Your System

5. Buffer overflow is:
   a) An overload of network packets
   b) Using memory overwrite to inject malicious code ✅
   c) Downloading large files causing system crash
   d) A form of ransomware attack
6. A zero-day vulnerability is:
   a) A bug fixed by vendor
   b) A well-known threat
   c) A flaw unknown to the vendor and unpatched ✅
   d) A vulnerability that only affects old hardware

Internet Security

7. HTTPS ensures:
   a) Faster page loading
   b) Access regardless of certificate
   c) Secure, encrypted communication ✅
   d) Compatibility with all browsers
8. Cookies can be risky because:
   a) They occupy too much disk space
   b) They constantly slow down browsing
   c) They track behavior and may share data externally ✅
   d) They are automatically deleted after every session

Mobile & Wireless Security

9. The most secure Wi-Fi standard currently is:
   a) WEP
   b) WPA
   c) WPA2
   d) WPA3 ✅
10. Not a recommended mobile/device practice:
    a) Use a screen lock
    b) Leave Wi-Fi/Bluetooth always on ✅
    c) Enable remote wipe feature
    d) Avoid connecting to public, open Wi-Fi

Secure Devices & Applications

11. Which encryption type uses both public and private keys?
    a) Symmetric
    b) Asymmetric ✅
    c) Hybrid
    d) Homomorphic
12. Cryptography is primarily used for:
    a) Reducing file size
    b) Improving network performance
    c) Ensuring data confidentiality and integrity ✅
    d) Simplifying password resets

---

8. CLOUD COMPUTING

☁️ Cloud Computing Part 1 – Notes & MCQs

Cloud Computing Basics

- **Definition**: Delivery of computing services (storage, servers, databases, software) over the Internet ("the cloud").
- **Components**: Infrastructure (IaaS), Platform (PaaS), Software (SaaS), and network connectivity.
- **Infrastructure**: Virtual servers, storage arrays, networking—all managed by cloud providers.
- **Services Overview**:
  - **SaaS**: Hosted applications (e.g., Office 365, G Suite)
  - **PaaS**: Developer services (e.g. app frameworks, containers)
  - **IaaS**: Basic compute and storage resources
- **Storage & Database Services**: Scalable storage (object, block, file), managed databases, redundancy.

Evaluate Cloud Computing for Business

- **Deployment Models**: Public (shared), Private (dedicated), Hybrid (combination).
- **Operational Benefits**:
  - Auto-scaling, global access, managed infrastructure, zero hardware maintenance.

- **Economic Benefits**:
  - Pay-as-you-go pricing, reduced capex, cost predictability, faster time-to-market.
- **Security Risks**:
  - Data breaches, shared tenancy, compliance challenges, weak access controls.

Cloud Storage

- **Storage as a Service**: On-demand, pay-per-use storage with geo-redundancy and scalability.
- **Providers**: AWS S3, Azure Blob, Google Cloud Storage, others.
- **Security**:
  - Encryption at rest and in transit, access control (IAM), secure backups.
- **Considerations**:
  - Data egress costs, compliance regulations, performance and latency, data lifecycle policies.

Cloud Tools and Services

- **Google / G Suite**: Gmail, Docs, Sheets, Drive—all in browser/cloud.
- **Microsoft Office 365**: Hosted Office apps, OneDrive, Exchange Online.
- **OneDrive**: File storage/service integrated with Windows, auto-sync, version history.
- **iCloud**: Apple's storage solution—syncs photos, files, and app data.
- **OneNote**: Note-taking app syncing across devices and platforms.

Cloud Tools for Teams

- **Office 365 Groups**: Shared workspace for collaborators—emails, documents, planner.
- **Microsoft Teams**: Chat, meetings, file collaboration integrated with Office 365.
- **Dropbox**: Cloud file sharing, team folders, comments, version control.
- **Google Docs/Workspace**: Real-time document collaboration, commenting, version history.
- **Asana**: Task and project management with team collaboration features.

Migrate to the Cloud

- **Migration Planning**:
  - Assess existing apps/services, define goals, choose migration type (lift-and-shift, refactor).

- **Service & Cost Analysis**:
  - Compare providers, estimate usage-based pricing, consider hidden charges.
- **Wave Approach**:
  - Migrate in stages based on priority or feasibility.
- **Data Security**:
  - Encrypt data, back up before migration, use secure transfer protocols.
- **Training Plan**:
  - Educate users on new tools and cloud practices.
- **Change Management**:
  - Prepare for workloads and scale, track adoption, iterate improvements.

Evaluate Cloud Performance

- **Post-Migration Monitoring**:
  - Use metrics: latency, uptime, resource utilization, costs vs SLAs.
- **Fine-Tuning Usage**:
  - Optimize resource allocations, autoscaling, cost-management tools.
- **Resources & Support**:
  - Utilize provider dashboards, feedback channels, best practices documentation.

✅ MCQs (Option-Wise)

Chapter 1: Basics

1. Cloud computing delivers:
   a) Hardware sales only
   b) On-premises solutions
   c) Internet-based compute and storage services ✅
   d) Only network security tools
2. SaaS stands for:
   a) Storage as a Service
   b) Software as a Service ✅
   c) Server as a Service
   d) Security as a Service

Chapter 2: Business Value

3. Which deployment offers dedicated infrastructure?
   a) Public Cloud

b) Hybrid Cloud
c) Private Cloud ✅
d) Community Cloud

4. A major financial advantage of the cloud is:
   a) Fixed long-term contracts
   b) No encryption requirements
   c) Pay-as-you-go billing model ✅
   d) High upfront capital expenditure

Chapter 3: Storage

5. What is a concern when using cloud storage?
   a) No backup options
   b) Latency and data egress costs ✅
   c) Only used for databases
   d) Requires local disks
6. Security of cloud storage mainly involves:
   a) Physical locks
   b) Encryption and access controls ✅
   c) Vendor-provided antivirus
   d) Only password protection

Chapter 4: Tools & Services

7. OneDrive offers:
   a) Cloud-based file synchronization, versioning, sharing ✅
   b) Email-marketing automation
   c) Real-time chat for Teams
   d) Infrastructure provisioning
8. Google Docs enables:
   a) Local-only file editing
   b) Real-time multi-user collaboration ✅
   c) Cost management dashboard
   d) Device encryption

Chapter 5: Team Tools

9. Microsoft Teams provides:
   a) Web development tools

b) Team-based chat, meetings, and collaboration ✅
c) Virtual machine management
d) Only email sharing

10. Asana is primarily used for:
a) Operating system deployment
b) Cloud file storage
c) Task and project management ✅
d) Video conferencing only

Chapter 6: Migration

11. The wave approach refers to:
a) Running backups simultaneously
b) Migrating in phases based on priority ✅
c) Implementing VPN waveforms
d) Encrypting data in multiple waves
12. An essential step before migrating data is:
a) Formatting all drives
b) Encrypting and backing up data ✅
c) Disabling user accounts indefinitely
d) Removing user permissions

Chapter 7: Performance

13. Post-migration performance is tracked using:
a) Physical access logs
b) Metrics like uptime, latency, resource usage ✅
c) Only financial statements
d) Disk defragmentation stats
14. Fine-tuning cloud use may include:
a) Increasing manual backups only
b) Reducing user training
c) Adjusting resource allocation and scaling ✅
d) Removing auto-scaling tools

☁️ **Cloud Concepts – AZ-900 Notes**

Cloud Service Models

- **Cloud Computing**: Delivery of services via the Internet—compute, storage, networking, databases, applications.

- **Virtualization**: Core to cloud; enables multiple virtual machines running on shared hardware.
- **Key Characteristics**: On-demand self-service, broad network access, resource pooling, elasticity, measured service.
- **Service Models**:
  - **IaaS (Infrastructure as a Service)**: Provider manages hardware/infrastructure; customer handles OS, applications, data, runtime (Learn the Content, Microsoft Azure, KodeKloud Notes).
  - **PaaS (Platform as a Service)**: Provider handles OS and runtime; customer manages apps and data (Learn the Content).
  - **SaaS (Software as a Service)**: Provider manages full stack; customer handles data and identity access (KodeKloud Notes).
- **Shared Responsibility Model**:
  - On-prem: customer manages everything.
  - IaaS: provider → infrastructure; customer → OS, applications, data, identity.
  - PaaS: provider → platform; customer → applications, data.
  - SaaS: provider → full stack; customer → data and identity access (KodeKloud Notes, Microsoft Learn).

Types of Cloud Deployments

- **Public Cloud**: Services delivered by third-party providers over the internet; multi-tenant (Learn the Content).
- **Private Cloud**: Dedicated to a single organization, either on-prem or hosted by a provider; offers enhanced control (Learn the Content).
- **Hybrid Cloud**: Combines public and private environments; enables workload mobility, scalability, and regulatory compliance (Microsoft Azure).
- **Sovereign / Government Clouds**: Managed separately to meet regional compliance and data residency requirements.

Benefits of Cloud Computing

- **Elasticity**: Automatic resource scaling up/down to meet real-time demand.
- **Scalability**: Vertical (increasing power) and horizontal (adding instances).
- **High Availability**: Designed across regions and availability zones to minimize downtime.
- **Fault Tolerance**: Systems remain operational during component failures.
- **Disaster Recovery**: Built-in redundancy and geo-replication ensure recovery from outages.
- **Security & Governance**: Access control, policy enforcement, auditing, and compliance frameworks.
- **Management & Governance**: Centralized tools and policies across subscriptions and resources (GitHub, Microsoft Learn).

✅ **Option-Wise MCQs (Chapter-wise)**

Chapter 1: Service Models

1. IaaS responsibilities include:
   a) Cloud hardware only

b) OS, apps, data management (customer) ✅
c) Provider installs runtime
d) User identity not required

2. In the shared responsibility model for SaaS, the customer is responsible for:
a) Platform updates
b) Hardware maintenance
c) Data and access controls ✅
d) Networking infrastructure

Chapter 2: Deployment Types

3. The cloud model that combines on-prem and cloud environments is:
a) Public cloud
b) Private cloud
c) Hybrid cloud ✅
d) Community cloud
4. Which cloud model is exclusively dedicated to one organization?
a) Public
b) Hybrid
c) Private ✅
d) Multi-cloud

Chapter 3: Benefits & Concepts

5. Elasticity in the cloud refers to:
a) Rigid vm provisioning
b) Automatically scaling resources ✅
c) Scaling only after manual approval
d) none
6. Fault tolerance means:
a) Single server hosting
b) Continued operations despite hardware failures ✅
c) User authentication failures
d) High latency in backups
7. Cloud governance ensures:
a) Only encryption
b) Compliance, access control, auditing ✅
c) Hardware speed
d) Network redundancy

---

9. POWERSHELL

💻 PowerShell – Notes & MCQs

PowerShell Overview

- **Why PowerShell?**
  - Built for task automation and configuration management.
  - Combines scripting, cmdlets, and object-based outputs.
- **Reading the Language**
  - Cmdlets follow the `Verb-Noun` format (e.g., `Get-Service`).
  - Parameters are prefixed with `-`, e.g., `-Name`, `-ComputerName`.
- **Getting Help**
  - `Get-Help` provides documentation and examples.
  - Use `Update-Help` to fetch the latest content.
- **Cmdlets & Aliases**
  - Popular aliases (e.g., `ls` → `Get-ChildItem`).
  - Use `Get-Alias` to view or search aliases.
- **Get-Service & Get-Member**
  - `Get-Service`: lists services on a system.
  - `Get-Member`: reveals objects' properties and methods.

Using PowerShell

- **Functions**
  - Reusable blocks of code that accept parameters and return values.
  - Defined with the `function` keyword.
- **Using `-WhatIf` and `-Confirm`**
  - Prevents unintended changes.
  - `-WhatIf` shows what would happen; `-Confirm` prompts before execution.
- **ISE (Integrated Scripting Environment)**
  - Provides script editing, debugging, and testing within PowerShell.
- **Working with Output**
  - Use `|` to pipe output between commands.
  - Format with `Format-Table`, `Out-GridView`, `Export-CSV`.
- **Grid View (`Out-GridView`)**
  - Interactive window for filtering and sorting objects visually.
- **Remote Execution**
  - Use `Invoke-Command -ComputerName` for remote commands.
  - Configure remoting with `Enable-PSRemoting`.

PowerShell On-Premises & Online

- **Modules**
  - Add cmdlets via modules (`Import-Module`, `Install-Module`).

    - Find modules in the PowerShell Gallery.
- **Server Cmdlets**
    - Administer local or remote Windows Server features via PowerShell.
- **Office 365 / Azure PowerShell**
    - Use specific modules like `AzureAD`, `MSOnline`, or `Az` modules to manage Office 365/Azure resources.
    - Supports automation of cloud configuration and user management.

✅ MCQs (Option-wise)

Chapter 1: PowerShell Overview

1. PowerShell cmdlets typically use what syntax?
a) `Get-Object`
b) `Verb-Noun` ✅
c) `Function-Action`
d) `CmdletName`

2. Which cmdlet shows object properties and methods?
a) `Get-Help`
b) `Get-Service`
c) `Get-Alias`
d) `Get-Member` ✅

Chapter 2: Using PowerShell

3. What does the `-WhatIf` parameter do?
a) Executes the command silently
b) Asks for confirmation automatically
c) Shows what would occur without executing ✅
d) Logs errors only if they occur

4. Which command opens results in an interactive window for filtering?
a) `Out-Table`
b) `Out-GridView` ✅
c) `Out-Long`
d) `Out-File`

Chapter 3: On-Premises & Online

5. How do you add cmdlets for Azure or Office 365?

a) `Get-Module`

b) `Install-Module` ✅

c) `Get-Help`

d) `Start-Module`

6. To execute a PowerShell script on a remote computer, you use:

a) `Enable-PSRemoting`

b) `Invoke-Command -ComputerName` ✅

c) `Start-Service`

d) `New-PSSession` ✅ *(both B and D valid options)*
